Fe CONTENT DEPENDENCE OF MAGNETIC PROPERTIES OF Sm(FeCo) RIBBONS

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Today SmCo permanent magnets have proliferated. They are used in many applying areas, e.g. in electric motors, medicine, electronics. But increasing of fundamental magnetic properties is still required.

There are a few ways of increasing of magnetic properties. One of them is variation of getting options. The aim of this work is an investigation of dependence of fundamental Sm(CoFe)-based magnetic properties on replacement Fe instead of Co.

$Sm(Co_{1-x}Fe_x)_5$ alloys with additional Sm 7 wt% were prepared by arc melting. $Sm(Co_{1-x}Fe_x)_5$ ribbons were prepared by melt-spining and annealed at 825 ˚C for 30 minutes. Measurements of the magnetic properties were made with MPMS-XL-7 EC squid-magnetometer at room temperature.

The measurements are shown in table.

Fe content dependence of specific saturation magnetization σ_s, specific remanence σ_r, and coercivity H_c

Alloy	σ_s, $\frac{emu}{g}$	σ_r, $\frac{emu}{g}$	H_c, kOe
$SmCo_5$	72	45	1.8
$Sm(Co_{0.9}Fe_{0.1})_5$	77	40	2.3
$Sm(Co_{0.7}Fe_{0.3})_5$	98	38	1.8
$SmFe_5$	129	13	0.1

As expected, saturation magnetization increases with the Fe concentration growing because Fe has more high saturation magnetization than Co. Decrease of the remanence is probably caused by both reduction of a hard magnetic phase and growth of a soft magnetic one. However, such low coercivity value indicates that there were inappropriate annealing options which lead to formation microcrystalline phase that have too large grain size. Thus, the next step is annealing the alloys with either annealing temperatures or holding times.